Assessment of mangrove ecosystem variations: a comparative study in Ba and Rewa delta, Fiji
(マングローブ生態系の変化に関する評価: フィジーBa デルタと Rewa デルタにおける比較研究)

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Despite the significance of mangroves, mangrove area status information is either scarce or lacking, hence gauging the changes within mangrove areas and identifying factors that influence mangrove change are inconsistent. Thus, more information is needed. This study aims at elucidating the mangrove area status, species composition and distribution and mangrove use scenarios in terms of livelihood support in Ba and Rewa deltas, Fiji.

Three different methodologies were carried out. Mangrove mapping was conducted by using two processed Landsat 8 (ETM) images for years 2000 and 2017. From the two Landsat images, Ba and Rewa deltas were masked out. Then, classification of five different classes, namely, mangrove, water body, forest, grass/bare land and built-up area was done by using maximum likelihood classification function. Reclassification was done to minimize the classes into three (mangrove, non-mangrove and water body) in order to calculate the total mangrove area for each delta. Field survey was carried out in three villages in Ba delta (Natutu, Nawaqarua and Votua) and 3 villages in Rewa delta (Muana-ira, Kiuva, Vutia and Kinoya) to identify the types of mangrove species distribution in each delta. Measurements of mangrove tree height and diameter at breast height (DBH) were also measured and phytosociological assessment in the form of important value index (IVI) to measure which mangrove species is dominant in each delta. Social survey was also carried out within the six villages. A total of 201 questionnaires were distributed to local people in the two deltas. All the data obtained though the field and social surveys were analyzed to identify the main drivers that influence the mangrove area changes.

In terms of the mangrove area status, the change in mangrove area differed between the two deltas. The mangrove area was increased by 16 ha in Ba delta whereas that was reduced by Rewa delta by 61 ha, from 2000 to 2017. There was a clear variation between the two deltas in terms of mangrove species distribution. Two species of mangroves (*Bruguiera gymnorrhiza* and *Rhizophora selala*) were observed to be dominant in Ba delta whereas three species of mangroves (*Bruguiera gymnorrhiza, Rhizophora selala* and *Rhizophora stylosa*) were identified in Rewa delta. The mangroves were relatively taller in Ba delta for all the species, while the DBH was varied in species and deltas. The IVI values show that *Rhizophora selala* was the dominant species in Ba delta whereas the *Bruguiera gymnorrhiza* was dominant in Rewa delta. These differences could be attributed to the differences in environmental conditions such as rainfall and mangrove area boundaries between the two deltas.

The social survey disclosed that 45% of the respondents from Ba delta visited the mangroves daily. In Rewa delta, on the other hand, 25% of the respondents visited the mangrove area once a week. The respondents from both deltas visited the mangrove areas mainly to get food resources in the form of fish and mud crabs. Four-fifths of the respondents in Ba delta sold their mangrove fish catch whereas only 40% of the respondents in Rewa delta sold their catch to support their daily lives. The results indicate that subsistence use of mangrove resources was a major occurrence in mangrove area for both deltas, however the impact of these activities varied between the two deltas.

This study suggests that mangrove area variations were subject to exposure to natural and anthropogenic impacts, where either natural or anthropogenic forces exerted a larger influence from the other. Moreover, mangrove ecosystem was an important source of food provision to support local daily livelihood. This study may also provide preliminary data on mangrove status and variations which could contribute to the updating of scientific guidelines for national strategies. These national strategies will then be used to identify mangrove areas that have been degraded and those that are still intact.